

Note: Problems 3 and 4 on second page.

Short Answer (15 points each)

1. The bid price of Morrogust Inc. \$14.50 and the ask price is \$14.52. Calculate much will you receive if you submit a market order to sell 300 shares of Morrogust. (Calculations required).

$$300 \times 14.50 = 4350$$

2. Based on the attached financial statements, did Ford turn over its inventory faster or slower in 2015 than in 2014? (Calculations required). *assuming Ford's inventory turnover in 2014 was 16 (not actual turnover)*

$$2015 = \frac{124,041}{8319} = 14.91 \quad 2014 = \frac{125,025}{7870} = 15.86 \Rightarrow \text{slower}$$

3. Based on the attached financial statements, did a larger or smaller percentage of Ford's capital come from debt in 2015 compared to 2014? (Calculations required). *assuming Ford's debt-to-capital ratio in 2014 was 0.9 (not actual #)*

$$2015 = \frac{12,839 + 120,015}{12,839 + 120,015 + 28,657} = .823$$

$$2014 = \frac{13,874 + 105,347}{13,874 + 105,347 + 24,465} = .830 \Rightarrow \text{smaller}$$

4. If interest rates rise, in what direction does the future value of an annuity change?

+15 rise

5. Assume interest rates rise by 2%. The price of which of the following bonds should fall the most?
 a) bond matures in 5 years and pays no coupons, b) bond matures in 5 years and pays a 2% coupon, c) bond matures in 5 years and pays a 10% coupon, d) bond matures in 10 years and pays no coupons, e) bond matures in 10 years and pays a 2% coupon, f) bond matures in 10 years and pays a 10% coupon.

+15 d)

Problems (75 points each)

Note: Unless I specifically state "calculations required", you can just set up all problems, and tell me what you are solving for in each step. If you are using the result of an unsolved equation in a later step, just make that clear. One way to do this, set up the equation and call your result "A" or "B", etc. If you prefer, you can solve everything.

Setting up means writing down the appropriate equations & plugging in the correct #s. Tell me if you are solving for something other than the left-hand side of the equation.

4. Assume that for each share it has issued, Audiomech ETF has purchased two shares of Ezio Corp and has sold short one share of Soule Corp. It has also purchased Treasury securities that mature one year from today for \$100 and has sold short Treasury securities that mature two years from today for \$150. The one-year risk-free rate is 4% per year and the two-year risk-free rate is 5% per year. Audiomech will pay out all cash flows from its investments each year. Audiomech currently trades for \$250, Ezio currently trades for \$650, and Soule currently trades for \$275. The possible payoffs on Ezio and Soule in each of the next two years depends on the state of the economy as follows:

Year State of Economy	1		2	
	Weak Strong	Strong Weak	Weak Strong	Strong Weak
Ezio	100	150	500	800
Soule	50	100	200	250

Identify the trades today (per share of Audiomech) that create an arbitrage profit today, show the cash flows created by all trades for all states of the economy in all time periods, and show your total cash flows for all states of the economy in all time periods. Use a "+" to indicate inflows and "-" to indicate outflows.

Calculations required. Important: you don't have to build the entire table.

No arbitrage price = $2 \times 650 - 275 + \frac{100}{1.04} - \frac{150}{(1.05)^2} = 985.10 \Rightarrow$ Short-sell

Transaction ₀	CF ₀	CF ₁		CF ₂	
		W	S	W	S
+5 Short ETF	+1000	-250	-300	-650	-1200 +6
+5 Buy Ezio (2)	-2(650)	+200	+300	+1000	+1600 +4
+5 Short Soule	+275	-50	-100	-200	-250 +4
+5 Buy 1-yr rf	-96.154	+100	+100	∅	∅ +4
+5 Short sell 2yr rf	+136.054	∅	∅	-150	-150 +4
Total	+14.90	∅	∅	∅	∅ +4

ETF CF:

yr1: W = $2(100) - 50 + 100 = 250$

S = $2(150) - 100 + 100 = 300$

yr2: W = $2(500) - 200 - 150 = 650$

S = $2(800) - 250 - 150 = 1200$

12. Two years and two months from today you would like to make the first of a series of quarterly withdrawals from an account that will grow by 1.5% each. You want your first withdrawal to equal \$250 and plan to make your final withdrawal five years and eight months from today. The account earns an APR of 5.5% with monthly compounding. Set up the calculations needed to determine how much you must deposit today to fund your withdrawals.



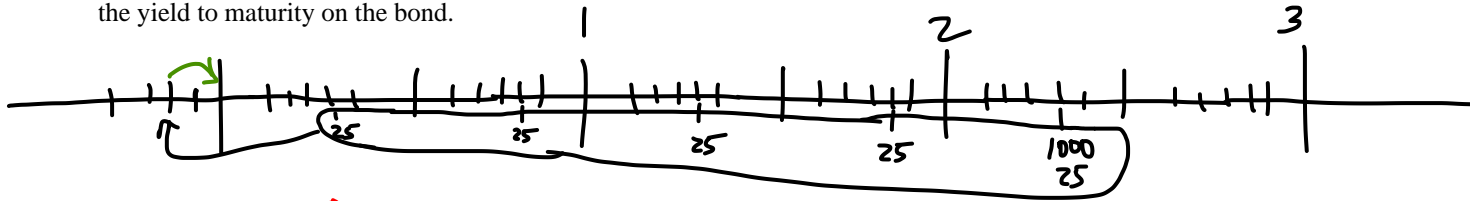
$$+6 \quad r\left(\frac{1}{2}\right) = \frac{.055}{12} \quad (19)$$

$$+6 \quad r\left(\frac{1}{4}\right) = (1 + r\left(\frac{1}{2}\right))^2 - 1 \quad (16)$$

$$+7 \quad V_{1y11m} = \frac{250}{r\left(\frac{1}{4}\right) - .015} \left(1 - \left(\frac{1.015}{1 + r\left(\frac{1}{4}\right)}\right)^{15}\right) \quad (24)$$

$$+6 \quad V_0 = V_{1y11m} \left(\frac{1}{1 + r\left(\frac{1}{2}\right)}\right)^{23} \quad (16)$$

23. A bond matures for \$1000 two years and four months from today. The coupon rate on the bond (which pays semiannual coupons) is 5% and the clean price of the bond is \$895. Set up the calculations needed to determine the yield to maturity on the bond.



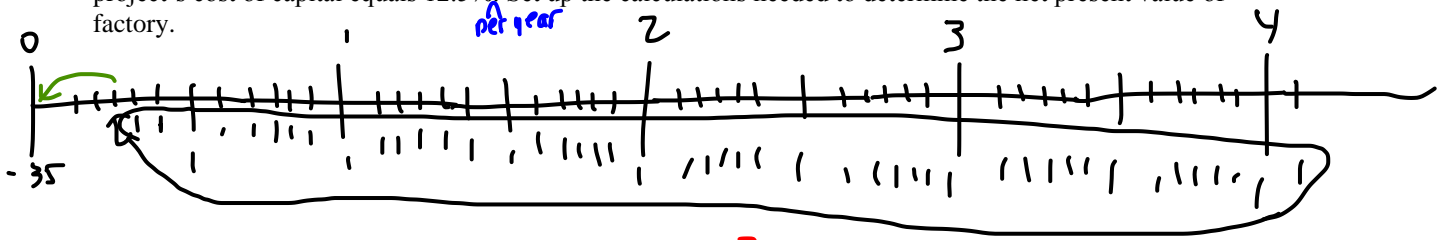
$$+5 DP = 895 + \frac{2}{6}(25) \quad (19)$$

$$DP = \underbrace{\left(\frac{25}{y} \right) \left(1 - \left(\frac{1}{1+y} \right)^5 \right)}_{+5} + \underbrace{\frac{1000}{(1+y)^{5.8}}}_{+5} \underbrace{\left(1+y \right)^{2/6}}_{+5} \Rightarrow \text{solve for } y \quad +3$$

$$+5 YTM = 2 \times y \quad +3$$

(8)

3 4. Small Effect Corp is considering investing \$35 million in a new factory that will generate net monthly cash flows beginning four months from today. The first cash flow will equal \$2 million and subsequent cash flows will shrink by 1% each through the final cash flow which will occur four years and 1 month from today. The project's cost of capital equals 12.5%. Set up the calculations needed to determine the net present value of factory.



$$+4 \text{ NPV} = -35 + \underbrace{\left(\frac{2}{(r(\frac{1}{12}) - (-.01))} \right)}_{+5} \left(1 - \left(\frac{1-.01}{1+r(\frac{1}{12})} \right)^{46} \right) \left(\frac{1}{1+r(\frac{1}{12})} \right)^3 \quad (27) \quad (17)$$

$$+7 \left(\frac{1}{12} \right) = \left(1.125 \right)^{1/12} - 1$$

(22)